$\sin\left(\frac{\pi}{6}\right) = \frac{1}{2}$

$\cos\left(\frac{\pi}{3}\right) = \frac{1}{2}$

$\tan\left(\frac{\pi}{2}\right) = \text{undef.}$

$\sin(\pi) = 0$

$\cos\left(\frac{3\pi}{2}\right) = 0$

$\cos\left(\frac{\pi}{6}\right) = \frac{\sqrt{3}}{2}$

$\sin\left(\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2}$

$\tan\left(\frac{\pi}{4}\right) = 1$

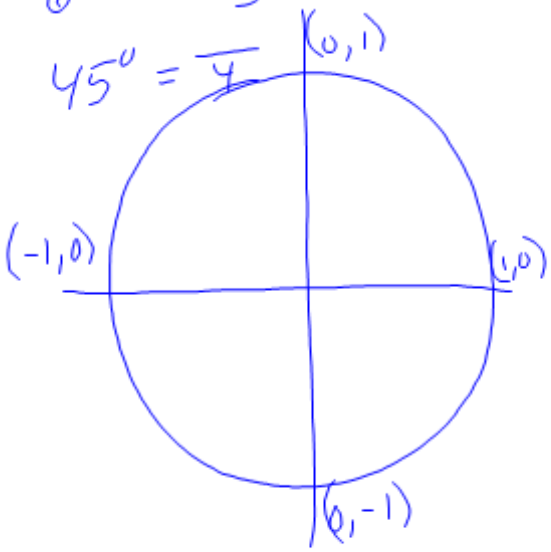
$\sin(0) = 0$

$\cos\left(\frac{\pi}{2}\right) = 0$

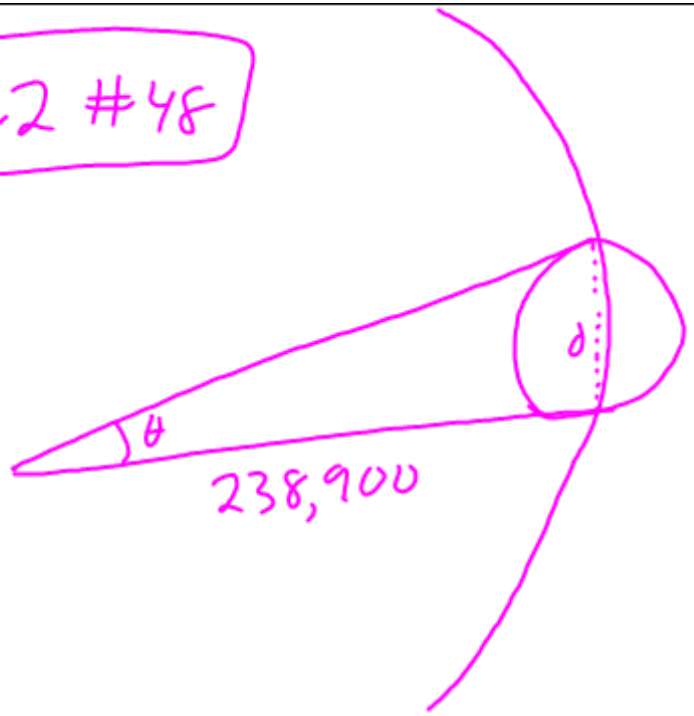
$30^\circ = \frac{\pi}{6}$

$60^\circ = \frac{\pi}{3}$

$45^\circ = \frac{\pi}{4}$



# 3.2 #48




$s = r\theta$

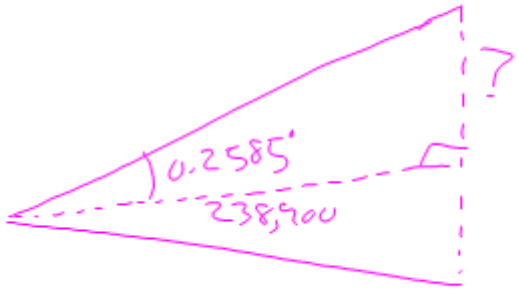
$\frac{\pi}{180} = \frac{x}{0.517}$

$\theta = 0.517°$ or $0.009$ radians

$r = 238{,}900$

$s = 238{,}900 \cdot 0.009$

$s \approx 2155 \approx d$




$\tan 0.2585 = \frac{?}{238{,}900}$

A standard record is 12" in diameter and rotates $33\frac{1}{3}$ times per minute.

$\omega = \frac{\theta}{t}$, $\omega$ = angular velocity
$\theta$ = angle in radians
$t$ = time

(a) Find the angle the record passes through in 10 sec. and 1 sec.

$\frac{33\frac{1}{3}}{60} = \frac{x}{10}$ or $33\frac{1}{3} \div 6 = 5.\overline{55}$ revolutions

$5.55 \cdot 360 = 2000°$

$5.55 \cdot 2\pi = 11.1\pi \approx 34.9$ rad.

in 1 sec.
3.49 rad/sec.
200°/sec

(b) Find the speed in inches per second of a point on the edge of the record.

$0.55$ rotations/sec. $C = \pi d$ $C = 37.699$ inches

$d = rt$
$r = \frac{d}{t}$

$37.699 \cdot 0.55 = 20.94$ inches/sec

linear velocity

$V = \frac{S}{t}$ $V$ = velocity, $S$ = distance, $t$ = time

(c) Find the speed in inches per second at a point 1 inch out from the center.

$C = \pi \cdot 2$ $C = 6.28 \cdot 0.55 =$ 3.49 inch/sec

$s = r\theta$

$\omega = \frac{\theta}{t}$

$V = \frac{s}{t}$

$V = \frac{r\theta}{t}$

$V = r\omega$

$s = r\omega t$

$s$ = distance

$r$ = radius

$\theta$ = angle in radians

$\omega$ = angular velocity

$t$ = time

$v$ = velocity

rotations or rotates $\Rightarrow 2\pi \Rightarrow \theta$

## Example 2 pg 118

A belt runs a pully of radius 6 cm at 80 revolutions per minute.

a) Find the angular speed in radians per second

$1 \text{ rev} = 2\pi$

$80 \text{ rev} = (80)(2\pi) = 160\pi \text{ radians/minute}$

$\omega = \frac{160\pi}{60} = \frac{8\pi}{3} \text{ radians/sec}$

b) The linear speed of the belt will be the same as that of a point on the circumference of the pulley

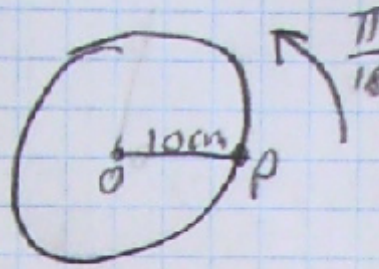
$v = r\omega$

$v = 6\left(\frac{8\pi}{3}\right)$

$v = 16\pi \approx 50.3 \text{ cm/sec}$

$s = r\theta$

Example




$\frac{\pi}{18}$ radians per sec.

A Find $w$ after 6 sec

$w = \frac{\theta}{t}$ $\quad \frac{\pi}{18} = \frac{\theta}{6} \quad \frac{6\pi}{18} = \boxed{\frac{\pi}{3} \text{ radians}}$

B. Find distance P travels after 6 sec

$s = r\theta \quad s = 10\left(\frac{\pi}{3}\right) = \boxed{\frac{10\pi}{3} \text{ cm}}$

C. $v = \frac{s}{t} = \frac{\frac{10\pi}{3}}{6} = \frac{10\pi}{3} \div 6$

$\frac{10\pi}{3} \cdot \frac{1}{6} = \boxed{\frac{5\pi}{9} \text{ cm per sec}}$

# Example 3

$r = 1600\text{km} + 6400\text{km} = 8000\text{km}$

$s = r\theta \qquad s = 8000(2\pi)$

$V = \frac{s}{t} \qquad V = \frac{8000(2\pi)}{2} = 8000\pi = 25{,}000\text{ km per hr}$

b. $r = 1600 + 6400 = 8000\text{km}$

$s = Vt \qquad 8000\pi(4.5) = 36{,}000\pi = 110{,}000\text{ km}$

Sect. 3.4

#1, 3, 4, 5, 7, 11, 15, 19, 27, 29, 35, ☆39, ☆40, ☆43